

Recommended Practice on Drilling Fluid Processing Systems Evaluation

API RECOMMENDED PRACTICE 13C
FIFTH EDITION, OCTOBER 2014

REAFFIRMED, MAY 2023



Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

Users of this Recommended Practice should not rely exclusively on the information contained in this document. Sound business, scientific, engineering, and safety judgment should be used in employing the information contained herein.

All rights reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 200 Massachusetts Avenue, NW, Washington, DC 20001.

Copyright © 2014 American Petroleum Institute

Foreword

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

Shall: As used in a standard, “shall” denotes a minimum requirement in order to conform to the specification.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order to conform to the specification.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 200 Massachusetts Avenue, NW, Washington, DC 20001. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 200 Massachusetts Avenue, NW, Washington, DC 20001.

Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, NW, Washington, DC 20001, standards@api.org.

Contents

Page

1	Scope	1
2	Normative References.....	1
3	Terms, Definitions, Symbols, and Abbreviations	1
3.1	Terms and Definitions.....	1
3.2	Symbols and Abbreviations.....	12
4	Requirements.....	13
5	System Performance of Drilled-solids Removal	13
5.1	Principle	13
5.2	Apparatus.....	14
5.3	Sampling.....	15
5.4	Procedure.....	15
6	Rigsite Evaluation of Drilled-solids Management Equipment	18
6.1	Principle	18
6.2	Application.....	18
6.3	Sampling of Streams for Capture Analysis	19
6.4	Determination of Mass Fraction (Percent) Solids	19
6.5	Calculation of Capture	20
6.6	Interpretation of Results.....	21
6.7	Procedure for Characterizing Removed Solids.....	21
6.8	Calculation of Mass Fraction (Percent) of Low-gravity Solids.....	21
6.9	Particle Size Assessment on Removed Solids	22
6.10	Economics	22
7	Practical Operational Guidelines.....	22
7.1	Principle	22
7.2	Apparatus.....	23
7.3	Procedure for Design and Operation	23
7.4	Design of Shale Shakers.....	26
7.5	Operation of Shale Shakers	27
7.6	Design of Degassers.....	27
7.7	Operation of Degassers	28
7.8	Design of Desanders and Desilters.....	28
7.9	Design of Mud Cleaners	30
7.10	Design of Centrifuges	30
7.11	Use of Addition Sections	31
7.12	Use of Drilling Fluid Mixing and Blending Equipment	31
7.13	Use of Suction Section	31
7.14	Use of Discharge Section.....	31
8	Conductance of Shale Shaker Screens	32
8.1	Principle	32
8.2	Principle of Conductance.....	32
8.3	Apparatus for Measurement of Conductance	33
8.4	Procedure for Calibrating Fluid	34
8.5	Procedure for Flow Test	34
8.6	Procedure for Measuring Pressure Drop	35
8.7	Procedure for Conductance Test.....	35
8.8	Calculation of Conductance.....	36

Contents

	Page
9 Shale Shaker Screen Designation	38
9.1 Principle	38
9.2 Apparatus	38
9.3 Preparation of Aluminum Oxide Test Media	40
9.4 Preparation of Test Screen	42
9.5 Test Procedure	42
9.6 Calculation of D100 Separation for Test Screen Cloth	43
10 Non-blanked Area of Shale Shaker Screen Panel	46
10.1 Principle	46
10.2 Apparatus	46
10.3 Procedure for Pretensioned or Perforated Panel-type Screens	46
10.4 Calculation for Pretensioned or Perforated Panel-type Screens	47
10.5 Procedure for Open-hook Strip Panels	47
10.6 Calculation for Open-hook Strip Panels	48
10.7 Example Calculation of Total Non-blanked Area for a Panel-mount Screen	48
11 Shale Shaker Screen Labeling	49
11.1 API Screen Designation	49
11.2 Label and Tag Format	51
11.3 API Screen Designation Label Examples	52
11.4 Other Screen Label and Tags	54
Annex A (informative) Derivation of Capture Equation	55
Annex B (informative) Finder's Method	57
Bibliography	60
Figures	
1 Process Stream Terminology for Centrifugal Separators	19
2 Sand Trap Design	25
3 Sieve Analysis with Unknown Sieve	45
4 Unknown Sieve Size Analysis	46
5 Unknown Sieve Marking Decision	47
6 Side-by-Side Basic Label	52
7 Side-by-Side Example Label	53
8 Top-and-Bottom Basic Label	53
9 Top-and-Bottom Example Label	54
B.1 Graphical Example of Finder's Method	58
Tables	
1 Drilling Fluid Report Data	17
2 U.S. Test Sieve Designations	39
3 ASTM Sieve Designation	39
4 Examples of Sample Preparation	41
5 D100 Separation and API Screen Number	44
6 Experimental Results	45
B.1 Example of Finder's Method Sample Preparation	58

Introduction

This standard is based on API 13C, 4th Edition, December 2010 (for drilling fluid processing systems evaluation) and shale shaker screen API 13E, 3rd Edition, May 1993 (for shale shaker screen cloth designation).

The purpose of this standard is to provide a method of assessing the performance of solids control equipment systems in the field. It includes procedures for evaluation of shale shakers, centrifugal pumps, degassers, hydrocyclones, mud cleaners, and centrifuges, as well as an entire system evaluation. Shale shaker screen labeling and separation potential of shale shaker screens have been addressed within this standard.

This standard covers equipment that is commonly used in petroleum and natural gas drilling fluids processing. This equipment can be purchased or rented from multiple sources, and is available worldwide. No single-source or limited-source equipment is included, either by inference or reference.

In this standard, quantities expressed in the International System of Units (SI) are also, where practical, expressed in U.S. customary units (USC) for information.

NOTE The units do not necessarily represent a direct conversion of SI units to USC units or of USC units to SI units.

Consideration has been given to the precision of the instrument making the measurement. For example, thermometers are typically marked in one degree increments, thus temperature values have been rounded to the nearest degree.

This standard refers to assuring the accuracy of the measurement. Accuracy is the degree of conformity of a measurement of a quantity to the actual or true value. Accuracy is related to precision or reproducibility of a measurement. Precision is the degree to which further measurements or calculations will show the same or similar results. Precision is characterized in terms of the standard deviation of the measurement. The result of calculation or a measurement can be accurate, but not precise, precise but not accurate, neither or both. A result is valid if it is both accurate and precise.

Users of this standard should be aware that further or differing requirements may be needed for individual applications. This standard is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This may be particularly applicable where there is innovative or developing technology. Where an alternative is offered, the vendor should identify any variations from this standard and provide details.

This document uses a format for numbers that follows the examples given in *API Document Format and Style Manual*, First Edition, June 2007 (Editorial Revision, January 2009). This numbering format is different than that used in API 13C, 4th Edition. In this document the decimal mark is a period and separates the whole part from the fractional part of a number. No spaces are used in the numbering format. The thousands separator is a comma and is only used for numbers greater than 10,000 (i.e. 5000 items, 12,500 bags).

Recommended Practice on Drilling Fluid Processing Systems Evaluation

1 Scope

This standard specifies a standard procedure for assessing and modifying the performance of solids control equipment systems commonly used in the field in petroleum and natural gas drilling fluids processing.

The procedure described in this standard is not intended for the comparison of similar types of individual pieces of equipment.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Recommended Practice 13B-1, *Recommended Practice for Field Testing Water-based Drilling Fluids*

API Recommended Practice 13B-2, *Recommended Practice for Field Testing Oil-based Drilling Fluids*

API *Manual of Petroleum Measurement Standards (MPMS)* Chapter 5 (all sections), *Metering*

ANSI/AWWA C700 ¹, *Cold-Water Meters—Displacement Type, Bronze Main Case*

ASTM E11-04 ², *Standard Specification for Wire Cloth and Sieves for Testing Purposes*

3 Terms, Definitions, Symbols, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

addition section

Compartment(s) in the surface drilling fluid system, between the removal section and the suction section, which provides (a) well-agitated compartment(s) for the addition of commercial products such as chemicals, necessary solids, and liquids.

3.1.2

agitator

mechanical stirrer

Mechanically driven mixer that stirs the drilling fluid by turning an impeller near the bottom of a mud compartment to blend additives, suspend solids, and maintain a uniform consistency of the drilling fluid.

3.1.3

aperture

(screen cloth)

Opening between the wires in a screen cloth.

¹ American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036, www.ansi.org.

² ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.